

ADDITIONAL LATE EOCENE RODENTS (MAMMALIA)

FROM THE UINTA BASIN, UTAH

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INTRODUCTION

North American Rodentia of the late Eocene, which seems to have been a time of development of more advanced groups within this order, have been reported primarily from three areas—southern California, central Wyoming, and the Uinta Basin of northeastern Utah. Stock and Wilson, working at the California Institute of Technology (see Wilson, 1949b, for pertinent references), conducted the main studies on Californian Eocene rodents, and rodents of the Badwater area, central Wyoming, were collected and reported by Wood (1949). Early expeditions into the Uinta Basin by the American Museum of Natural History, Princeton University, and other institutions led to descriptions of some rodents from there (e.g., Osborn, 1895; Scott, 1895). Carnegie Museum's collecting activities in that area began in 1908, and rodents in this museum's collections were studied by Peterson (1919) and later by Burke (1934, 1935). Late Eocene paramyid rodents from all three areas were recently discussed by Wood (1962).

The rodents reported here are additions to the late Eocene Uinta Basin fauna. All specimens but one, which was obtained for Yale University in 1877, were collected by Carnegie Museum field parties in 1931, 1961, and 1963. These additions not only contribute to the over-all picture of the kinds of late Eocene rodents from northeastern Utah (table 1). They show, also, interesting faunal connections of this geographically-somewhat-intermediate area with the late Eocene faunas of both Wyoming and southern California.

Thanks for loans and access to collections in their care are extended to Drs. Theodore Downs and J. R. Macdonald, Los Angeles County

Museum; C. L. Gazin, United States National Museum; M. C. McKenna, American Museum of Natural History (AMNH); E. L. Simons, Yale Peabody Museum (YPM); and A. E. Wood, Amherst College. I appreciate discussions of the rodents herein reported with Drs. C. C. Black, R. W. Wilson, and A. E. Wood. Illustrations were prepared by Dr. Florence D. Wood.

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TABLE 1. RODENTS FROM THE LATE EOCENE, UINTA BASIN

	Uintan		Duchesnean	
	Wagonhound	Myton	Randlett	LaPoint
Paramyidae ¹				
<i>Leptotomus</i>				
<i>L. leptodus</i> (Cope, 1873)	x	x		
<i>L. mytonensis</i> Wood, 1962		x		
<i>L. kayi</i> Burke, 1934			x	
<i>L. sciuroides</i> (Scott and Osborn, 1887)		x		
<i>Thisbemys</i>				
<i>T. uintensis</i> (Osborn, 1895)	x			
<i>T. medius</i> (Peterson, 1919)		x		
<i>Reithroparamys</i>				
<i>R. gidleyi</i> (Peterson, 1919)		x		
<i>Microparamys</i>				
<i>M. dubius</i> (Wood, 1949) ²	x			
<i>Ischyrotomus</i>				
<i>I. petersoni</i> (Matthew, 1910)	x	x		
<i>I. compressidens</i> (Peterson, 1919)	x	x		
<i>I. eugenei</i> Burke, 1935		x		
<i>Mytonomys</i>				
<i>M. robustus</i> (Peterson, 1919)	x	x	x	
?Paramyidae				
<i>Janimus</i>				
<i>J. rhinophilus</i> ²		x		
Cylindrodontidae				
<i>Pareumys</i>				
<i>P. grangeri</i> Burke, 1935	x			
<i>P. milleri</i> Peterson, 1919		x		
<i>Pareumys</i> sp. ³			x	
?Pareumys				
? <i>P. troxelli</i> Burke, 1935	x			

	Uintan		Duchesnean	
	Wagonhound	Myton	Randlett	LaPoint
Sciuravidae				
<i>Sciuravus</i>				
<i>S. altidens</i> Peterson, 1919	x			
<i>S. popi</i> ²	x			
<i>Sciuravus</i> cf. <i>S. popi</i> ²	x			
Protoptychidae				
<i>Protoptychus</i>				
<i>P. hatcheri</i> Scott, 1895	x			
Eomyidae				
<i>Protadajdaumo</i>				
<i>P. typus</i> Burke, 1934				x
?Sciuravid or myomorph sp. ² ⁴			x	

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UNIVERSITY¹ Following Wood, 1962.² This paper.³ Probably Burke's (1934: 391) *Tillomys* type (Wilson, 1949b: 82).⁴ Possibly Burke's (1934: 391) *Sciuravus* type.

SYSTEMATIC DESCRIPTIONS

Family PARAMYIDAE

Microparamys dubius (Wood, 1949)

Figures 1-3

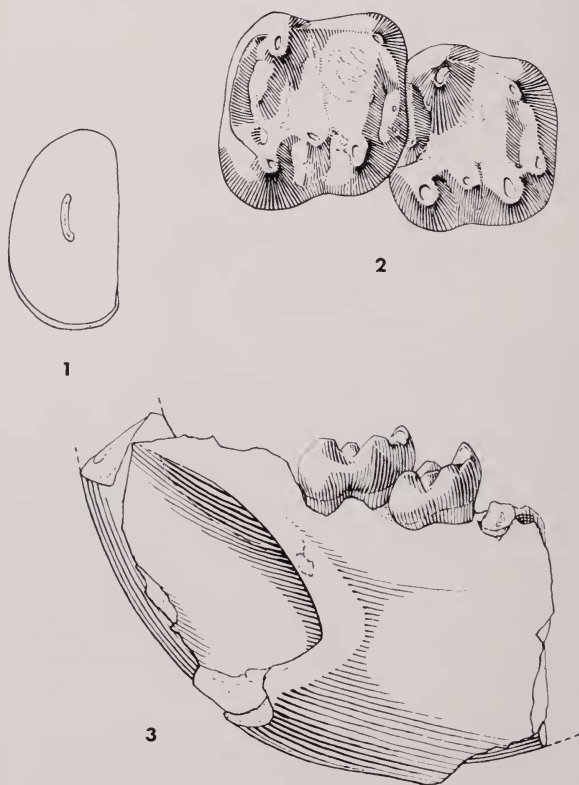
SPECIMEN: CM 14919, right jaw fragment with M₁₋₂.

GEOLOGIC AGE AND LOCALITY: Uintan (Wagonhound member), late Eocene; badlands east of White River Pocket, Uintah Co., Utah.

Sciuravus dubius was described by Wood (1949: 558) on the basis of isolated teeth including M₃, probable M₂, and several incisors from upper Eocene deposits along Badwater Creek, Natrona County, Wyoming. Since Wood's work, more teeth of the species, representing both upper and lower dentitions, have been obtained from the Badwater deposits by Carnegie Museum field parties. Comparisons with Wood's original material and with the more recently collected specimens from Badwater, which will be described later, indicate that CM 14919 is referable to Wood's species.

DESCRIPTION: The incomplete jaw of CM 14919 (fig. 3) has a masseteric fossa extending forward to a line below the trigonid of M₂; the ridge marking attachment of the masseter lateralis muscle reaches to a line below the talonid of M₁. The position of the mental foramen is indicated by a notch in a line just anterior to the alveolus of P₄. In

broken cross section the lower incisor (fig. 1) has a flattened medial surface, is slightly convex ventrally, and more convex laterally. The greatest width of the incisor occurs about one-third of the way up from the ventral surface. Of the two molars, M_2 is unbroken, whereas M_1 appears to have been crushed against M_2 with resultant anteroposterior compression of the talonid, and elevation of the posterior cingulum and hypoconulid on the more anterior tooth. The brachydont molars (fig. 2) have the following characters: (1) a well developed anterior cingulum that is cusped buccally and extends lingually to contact the metaconid; (2) a small trigonid basin closed posteriorly by metalophulid II, which reaches to the posterior flank of the metaconid; (3) a distinct mesoconid;



Figs. 1-3: *Microparamys dubius*, CM 14919, right-jaw fragment with M_{1-2} . fig. 1: Cross section of broken lower incisor, approx. $\times 18$. fig. 2: Occlusal view of M_{1-2} , approx. $\times 18$. fig. 3: Lateral view of jaw, approx. $\times 8$.

(4) no distinct mesostylid¹; (5) a crested entoconid that is separated lingually from the posterior cingulum; (6) a long curved posterior cingulum. On M_1 the trigonid is narrower relative to the talonid than on M_2 . In this specimen, wear on M_1 is in a stage in which a ridge connects the cusate anterior cingulum to the protoconid, whereas these structures are separated by a groove on M_2 . Trigonid basin and metaconid are more compressed anteroposteriorly on M_2 than on M_1 . On M_2 the mesoconid is ridged buccally and enamel in the talonid basin is wrinkled.

DISCUSSION: In the original description Wood (1949: 558) considered *Sciuravus dubius* closest to species of *Sciuravus*, although he discussed similarities of the new species to *Reithroparamys* and suggested that better material might require reference of the species to a new genus. Later, Wood (1959: 162) established the genus *Microparamys* for several small species of paramyids. His further studies on paramyids (1962) led to reference of several more species to that genus and recognition of some characters of *Microparamys* that suggest affinities with the Sciuravidae and others in which the genus resembles *Reithroparamys*. *Microparamys* is characterized by small size, lower molars having an anterior cingulum that tends to be isolated from the protoconid, usually well developed mesoconid, entoconid isolated lingually from the posterior cingulum, and masseteric fossa terminating below the trigonid of M_2 or below M_1 . *Sciuravus dubius* appears to have a general dental pattern most similar to that in *Microparamys*, and the species is accordingly referred here to that genus.

The following is an emended diagnosis of *Microparamys dubius*, based on Wood's type, topotypes, and CM 14919: microparamyine smaller than *Microparamys minutus* and *M. tricus*, larger than *M. wilsoni*; anterior cingulum cusate buccally, separated from protoconid in early stages of wear; trigonid basin closed posteriorly by anterolingually directed metalophulid II; no distant mesostylid; entoconid crested; posterior cingulum long, curved; masseteric fossa reaching to below trigonid of M_2 , ridge to below talonid of M_1 .

¹The terms "mesostylid" and "metastylid" are used by Wood and Wilson (1936: 390) for lingual cusps in the talonid basin, the metastylid being more anteriorly situated. When only one cusp occurs lingually in the basin it may be difficult to determine which term is more appropriate, but "mesostylid" is used here when the cusp is more or less centrally situated in the lingual exit of the basin and "metastylid" when more clearly on the posterior flank of the metaconid.

Within the genus *Microparamys*, *M. dubius* agrees with Wood's (1962: 158) group of forms with progressive tooth patterns. Other late Eocene members of this group are *Microparamys* sp. D, and *M. tricus*, both from the late Eocene of California. In *Microparamys* sp. D, M_2 is slightly larger than in *M. dubius*, metalophulid II extends farther linguad, and a mesostylid is present. *Microparamys tricus* is a larger rodent than *M. dubius*, but resembles that species among microparamyines in lacking a distinct mesostylid.

TABLE 2. MEASUREMENTS (IN MILLIMETERS) OF TEETH OF *Microparamys dubius* AND *Janimus rhinophilus*

	<i>M. dubius</i> CM 14919	<i>J. rhinophilus</i> CM 9951
M_1		
anteroposterior	1.2	—
width trigonid	1.15	—
width talonid	1.3	—
M_2		
anteroposterior	1.35	1.7
width trigonid	1.35	1.65
width talonid	1.4	1.6
M_3		
anteroposterior	—	1.9
width trigonid	—	1.6
width talonid	—	1.5
Lower incisor		
anteroposterior	1.6	1.9
width	0.9	1.3

Family ?PARAMYIDAE

*Janimus*¹ *rhinophilus*², new genus and new species

Figures 4-6

TYPE SPECIMEN: CM 12005, fragment of right jaw with M_{2-3} , lower incisor.

HYPODIGN: Type only.

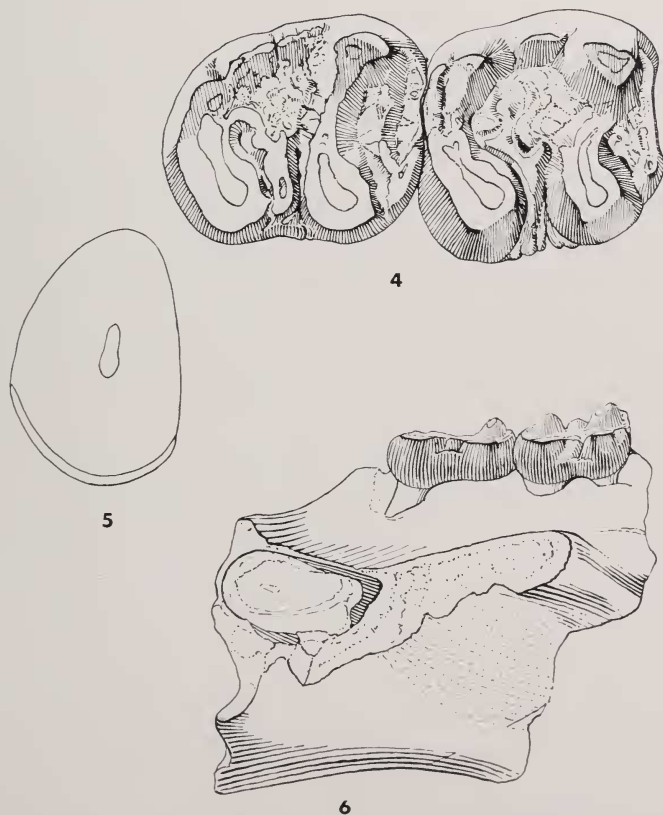
GEOLOGIC AGE AND LOCALITY: Uintan (Myton member), late Eocene; Myton Pocket, Uintah Co., Utah.

¹For Janet Dawson, in appreciation of her assistance in the field work that produced this specimen, and of her other aid, direct and indirect, to field studies.

²In reference to finding this fossil rodent embedded in matrix at the bend of the knee of an amynodont rhinoceros.

GENERIC AND SPECIFIC CHARACTERS: Lower molars brachydont with accessory folds prominent in talonid basin; anterior cingulum, separated by groove from protoconid (in early wear), forms entire anterior edge of molars, extending linguad anterior to metaconid; metalophulid II closes trigonid basin; entoconid well developed, crested on M_2 ; prominent mesostylid; mesoconid with posterolingual spur; no complete ectolophid. Incisor convex ventrally and laterally. Ascending ramus originates approximately in line with mid- M_2 . Size smaller than *Microparamys tricus*, larger than "*Mysops*" *kalicola*.

DESCRIPTION: Known cheek teeth, M_{2-3} (fig. 4), are slightly worn but their occlusal pattern remains evident. A well developed anterior cingulum, buccally separated by a groove from the protoconid, forms the entire anterior edge of these teeth, and at its lingual end curves back to



Figs. 4-6: *Janimus rhinophilus*, type specimen, CM 12005, right-jaw fragment with M_{2-3} . fig. 4: Occlusal view of M_{2-3} , approx. $\times 18$. fig. 5: Cross section of broken lower incisor, approx. $\times 18$. fig. 6: Lateral view of jaw, approx. $\times 9$.

contact the anterior surface of the metaconid. Thus, the metaconid is not marginal but is set back from the anterior edge of the molars. Metalophulid II closes the trigonid basin posteriorly. Within the trigonid basin an accessory ridge extends from the buccal end of the cingulum approximately to the mid-line on M_2 and to the metaconid on M_3 . The surface of the relatively open talonid basin is wrinkled into a number of rugosities. On M_2 the well developed entoconid is crested, with the crest extending buccally and slightly posteriorly and contacting a ridge from the hypoconid that continues to the lingual border of the tooth as the posterior cingulum. On M_3 the entoconid is less elevated, not crested, and contacted posteriorly by the short posterior cingulum. The teeth seem to lack an ectolophid, but have an anteroposteriorly compressed mesoconid that has a short posterolingual spur, especially prominent on M_2 . Accessory cuspules occur in the valley buccal to the mesoconid. A well developed mesostylid, more raised on M_2 than on M_3 , blocks the lingual end of the talonid basin.

The lower incisor in broken, most anterior cross section (fig. 5) is convex ventrally and laterally with greatest transverse width slightly below mid-depth. Enamel extends up the lateral side approximately to the point of greatest width.

The jaw fragment (fig. 6) exhibits only part of the dorsal ridge bordering the masseteric fossa. A narrow trough is present between the cheek teeth and the broken basal portion of the ascending ramus, which appears to have stood out laterally from the horizontal ramus and originated approximately in line with the middle of M_2 .

COMPARISONS AND RELATIONSHIPS: Presence of a distinct anterior cingulum and accessory crenulations on the lower molars of *Janimus* bring to mind these structures in teeth of the early Eocene microparamyine, *Lophiparamys murinus* (Wood, 1962: 167-169), which resembles *Janimus* also in development of the mesostylid. In detail, however, the two genera differ, with *Lophiparamys* being characterized by the following: (1) accessory crenulations of molars less coarse; (2) anterior cingulum not present anterior to marginal metaconid, which descends steeply into the more open talonid basin; (3) entoconid smaller relative to metaconid and not crested; (4) M_3 more elongated, tapered posteriorly; (5) lower incisor narrower transversely. *Microparamys* likewise differs from *Janimus* in having a marginal metaconid without the lingual extension of the anterior cingulum characteristic of *Janimus*, a more distinctly paramyid talonid basin, relatively smaller entoconid,

and, in early and middle Eocene species, in lacking a transversely crested entoconid. *Microparamys tricus* and *M. dubius*, late Eocene species, parallel *Janimus* in showing some development of the entoconid crest. Although *Microparamys* sp. D (Wood, 1962: 165-166) differs from *Janimus* in most of the same characters as do other species of *Microparamys*, it shows interesting similarities to *Janimus* in having traces of crenulated enamel in the talonid basin, and a long metalophulid II.

The relatively well developed entoconid and its crest on M_2 in *Janimus* are suggestive of somewhat corresponding lower molar structures found in sciuravids. Sciuravids typically have even greater development, on M_3 as well as M_2 , of the entoconid and entoconid crest, with an essentially obliterated talonid basin, and lack the anterior cingulum characteristic of *Janimus*. A short anterior cingulum occurs in the very small sciuravid, *Pauromys*, but the mesolophid, more closed talonid basin, short posterior cingulum, and other features of this genus clearly separate it from *Janimus*.

The early Eocene (Lost Cabin) "*Mysops*" *kalicola* (Matthew and Granger, 1918: 618-619) is a rodent whose relationships have long been uncertain. Although generally recognized at present as not closely related to the cylindrodontid genus *Mysops*, familial affinity of the species has not been established. For example, Wilson (1949b: 79, 90-91) favored referring it to the Paramyidae (then Paramyinae), although recognizing trends in the entoconid creasing of "*M.*" *kalicola* toward sciuravid and cylindrodontid characteristics. And Wood (1962: 168, fig. 90) has regarded the species as a sciuravid possibly related to the microparamyine *Lophiparamys*. The type specimen of "*Mysops*" *kalicola*, AMNH 14731, right jaw with P_4 - M_2 , can be compared with *Janimus* only in M_2 and a few features of the ramus.¹ Points of resemblance of "*M.*" *kalicola* to *Janimus* are found in the following characters: (1) anterior cingulum forming entire anterior edge of molars and extending to the lingual border anterior to the metaconid, although the metaconid is not set back so far as in *Janimus*; (2) long metalophulid II; (3) entoconid nearly as well developed and distinctly crested; (4) short spur from mesoconid into talonid basin. "*Mysops*" *kalicola* has crenulations in the enamel of the talonid basin, although these are not as promi-

¹Matthew and Granger's figure of "*M.*" *kalicola* (1918: fig. 38) shows M_3 taken from AMNH 14729, a paratype. This "paratype" does not represent "*M.*" *kalicola* and seems to be most similar to *Microparamys lysitensis*.

nent as the accessory folds in *Janimus*. Other differences from *Janimus* include the following: (1) absence of a mesostylid; (2) suggestion of an ectolophid, although this is not well developed; (3) more directly transverse orientation of entoconid crest; (4) transversely narrower incisor; (5) ascending ramus originating about in line with the middle of M_3 .

As now known *Janimus rhinophilus* is a morphologically distinct late Eocene rodent having somewhat lophate lower molars with complications of occlusal pattern due to accessory folds or crenulations. Suggestion of some advance over the general paramyid and sciuravid jaw structure is indicated by the probable more anterior and lateral position of the ascending ramus. The new genus shares with microparamyine paramyids the well developed anterior cingulum and talonid basin. The lack of an entoconid crest on M_3 is a further paramyid resemblance. Similarity to sciuravids is shown in the large, crested entoconid on M_2 , which, however, can be found in cylindrodontids and some microparamyines as well. Of known pre-Uintan rodents, the early Eocene "*Mysops*" *kalicola* is the species most similar to *J. rhinophilus*, as shown by the anterior cingulum, crested entoconid, and traces of crenulations in the enamel, but it differs in more marginal metaconid and other details. Certainty in relationships cannot be attained until both species are known by more complete material, especially upper dentitions. But it seems reasonable that *Janimus rhinophilus* represents a line of rodent evolution derived from near "*M.*" *kalicola* and more distantly from microparamyines.

It appears that in the early Eocene several lines of mostly small-sized rodents developed cresting of the lower molars. These include microparamyines, early sciuravids, and "*Mysops*" *kalicola*. Cylindrodontids, first known from the middle Eocene might be traceable into this complex also. It is sometimes difficult to determine differences of familial magnitude within this early Eocene complex, but developments out of the early microparamyines and sciuravids led to distinct later Eocene rodent types. *Janimus*, probably derived from near "*M.*" *kalicola*, retained the relatively open talonid basin of paramyids, and shows other similarities to microparamyines that lead to a tentative reference to ?Paramyidae. This tentative assignment seems to express most clearly the probable earlier affinities of this rodent and seems reasonable until the Eocene record reveals more evidence on the morphology of this late Eocene rodent and its probable earlier relative, "*Mysops*" *kalicola*.

As for resemblance between *Janimus* and later rodents, suggestive similarity is found between the pattern on the lower molars of *Janimus*

and that of an early eutypomyid from the Chambers Tuff, Vieha Group, of Texas, now being studied by A. E. Wood (personal communication). Discussion of relationships between *Janimus* and this Duchesnean or early Chadronian eutypomyid awaits completion of Wood's study.

Family SCIURAVIDAE
Sciuravus popi,¹ new species

Figures 8-10

TYPE SPECIMEN: CM 14918, fragment of right maxilla with P⁴-M¹, left M₁, M₂, postcranial fragments.

GEOLOGIC AGE AND LOCALITY: Uintan (Wagonhound member), late Eocene; badlands east of White River Pocket, Uintah Co., Utah.

HYPODGM: Type and YPM 16875, right lower molar, probably M₂, from "mouth of White River, Utah" (collected in 1877; locality data are inadequate for more precise age determination than Uintan).

SPECIFIC CHARACTERS: Species of *Sciuravus* larger than *S. powayensis* and *S. altidens*. P⁴ tending toward quadrate shape with relatively well developed hypocone; M¹ having loph from hypocone toward mesostyle in central valley; large mesoconid on lower molars, with short mesolophid on M₁.

DESCRIPTION AND COMPARISONS: Teeth of the rodent represented by CM 14918 are well worn, but YPM 16875 is from a younger individual. The upper teeth (fig. 8) are somewhat high-crowned lingually, and on M¹ the groove between protocone and hypocone extends nearly to the limit of the enamel. *Sciuravus altidens*, a smaller species, is similar in having lingual hypsodonty but has a groove between protocone and hypocone that does not reach so far up the lingual wall. A wear facet on the anterior surface of P⁴ shows that P³ was present, as in other species of *Sciuravus*. A suggestion of molarization of P⁴ is shown by its relatively well developed hypocone and somewhat quadrate shape. On P⁴ lingual to the rounded metacone a ridgelike structure, probably a metaconule, extends essentially transversely toward the shallow groove between protocone and hypocone. In contrast, the metaconule of the more triangular P⁴ in *S. nitidus* is directed anterolingually toward the protocone; in *S. altidens* and *S. powayensis* there is no discrete metaconule but rather a ridged metacone, which reaches anterolingually in the former and is more transversely oriented in the latter.

The only known upper molar, M¹, can be distinguished from that of

¹For Dr. J. LeRoy "Pop" Kay, Curator Emeritus of Vertebrate Fossils, Carnegie Museum, in sincere appreciation of his many years of productive field work in the Uinta Basin.

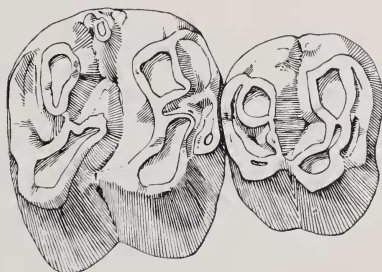
other species of *Sciuravus* by a distinctive pattern of lophing from the hypocone. The hypocone has one short spur directed toward the anteroposteriorly compressed metacone and a second, more elongated loph extends in a transverse direction into the central valley. This loph stops just short of a contact with the anteroposteriorly compressed mesostyle, so style and loph do not quite make a continuous ridge in the central valley. In most other species of *Sciuravus* the anterior arm of the hypocone on M^1 extends anterobuccally and then swings posteriorly to contact the metacone. In *S. powayensis* the arm is short and lacks the posteriorly directed extension to the metacone. At any rate, the development of a loph in the central valley of M^1 is not found in other known species of the genus. Buccal to the mesostyle a small cuspule and cingulum occur in the exit of that valley.

On worn M_1 and M_3 of CM 14918 (figs. 9, 10) the lingual wall of the metaconid extends posteriorly in a shelf-like ridge. The less worn M_2 of YPM 16875 has a distinct metastylid on the posterior slope of the metaconid that would form this ridge as wear progressed. The mesoconid is large on the lower molars and on M_1 is extended lingually in a short mesolophid. A mesostylid occurs lingually and an ectostylid, buccally on M_1 and M_2 . On M_3 the hypolophid extends in a posterobuccal direction to the hypoconid. This tooth in *Sciuravus nitidus* exhibits considerable variation in the crest of the entoconid. A sample of *S. nitidus* from Bridger B deposits in the collections of the United States National Museum shows the entoconid crest of M_3 connected to the mesoconid in some specimens, to the hypoconid in others, and toward an intermediate area in still others. Whether the condition of M_3 in CM 14918 is characteristic of the species or is individually variable cannot be determined on the basis of the known material. *Sciuravus powayensis* differs from CM 14918 in having the entoconid crest or hypolophid of M_3 swing forward toward or to the mesoconid.

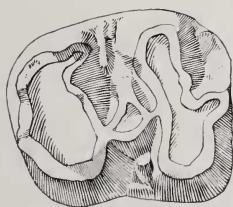
RELATIONSHIPS: *Sciuravus* has been reported from deposits ranging in age from late Wasatchian (Gazin, 1962) to early Uintan (Peterson, 1919: 64-65; Wilson, 1940: 87-91). The type species, *S. nitidus*, ranges through the Bridgerian and as currently defined demonstrates considerable individual variation. Some tendency exists in geologically younger representatives of that species toward development of a mesolophid on the lower molars, and increase in size. Three Uintan species are now known, *S. powayensis* from southern California, *S. altidens* and *S. popi*, both from the Uinta Basin. Of these *S. popi* exhibits size increase be-



7



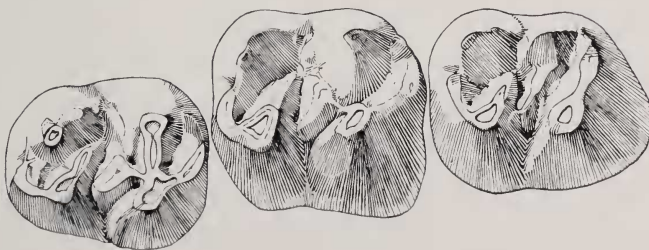
8



9



10



11

Figs. 7-11: Occlusal views of rodent teeth. fig. 7: CM 9951, left upper molar, approx. x12. Figs. 8-10: *Sciuravus popi*, type specimen, CM 14918. fig. 8: P¹-M¹. fig. 9: M₁. fig. 10: M₃. fig. 11: *Sciuravus* cf. *S. popi*, CM 14920, M₁₋₃. Figs. 8-11 approx. x9.

yond that of *S. nitidus*, possibly indicating continuation of the trend toward larger size shown by later Bridgerian specimens of the latter. Other than similarity between *S. altidens* and *S. popi* in development of some lingual hypsodonty, and between *S. powayensis* and *S. popi* in transverse orientation of the metaconule or metacone crest on P^4 , the three Uintan species show few morphological details of special resemblance and it seems reasonable to interpret them as independently derived from Bridgerian *Sciuravus*.

Sciuravus cf. *S. popi*

Figure 11

SPECIMEN: CM 14920, fragmentary left jaw with M_{1-3} , right M_3 .

GEOLOGIC AGE AND LOCALITY: Uintan (Wagonhound member), late Eocene; badlands east of White River Pocket, Uintah Co., Utah.

This specimen, found in deposits near those from which the type specimen of *Sciuravus popi*, CM 14918, was derived, represents a young individual having lower molars slightly smaller than in CM 14918 and YPM 16875 but showing a general resemblance in pattern to those specimens. In the talonid basin of M_1 , CM 14920 has a small lophid seemingly not connected to the mesoconid and, more lingually, a very small mesostylid. Only faint indications of these structures, little more than crenulations, occur on M_2 . Another pattern difference from *S. popi* is shown by absence of ectostylids on M_{1-2} in CM 14920. A more prominent difference from CM 14918 is exhibited by M_3 , on which the crest of the entoconid extends anterobuccally, unites with the compressed mesoconid, and forms a lophid separated by a groove from the hypoconid-posterolophid. As mentioned above, among specimens referred to the Bridgerian *S. nitidus*, entoconid crests of the types found in both CM 14918 and CM 14920 occur, as well as intermediates between these types. More complete material is required, however, before it can be determined whether these two Uintan specimens represent individual variants or distinct species. Only a tentative reference of CM 14920 to *Sciuravus* cf. *S. popi* seems desirable on known specimens. Caution in reference is promoted by the possibility that CM 14920 represents the previously unknown lower dentition of the other early Uintan sciuravid from the Uinta Basin, *S. altidens*.

An interesting condition of M_1 shown by CM 14920 is presence of two distinct roots below the trigonid of M_1 . Usually in *Sciuravus* one sturdy root is present below the molar trigonids, with faint suggestion of separation into two parts occurring only at the very tip of that root.

TABLE 3. MEASUREMENTS (IN MILLIMETERS) OF TEETH OF SCIURAVIDS AND ? SCIURAVID OR MYOMORPH

	<i>Sciuravus popi</i>		<i>Sciuravus</i> cf. <i>S. popi</i>	? sciuravid or myomorph
	CM 14918	YPM 16875	CM 14920	CM 9951
P ¹				
anteroposterior	2.3	—	—	—
width	2.6	—	—	—
M ¹				
anteroposterior	2.9	—	—	1.7
width	3.1	—	—	1.6
M ₁				
anteroposterior	3.1	—	2.95	—
width trigonid	2.4	—	2.1	—
width talonid	2.9	—	2.65	—
M ₂				
anteroposterior	—	3.1	3.0	—
width trigonid	—	2.8	2.7	—
width talonid	—	2.8	2.9	—
M ₃				
anteroposterior	3.55	—	3.2	—
width trigonid	2.8	—	2.5	—
width talonid	2.8	—	2.5	—

Family *incertae sedis*
? Sciuravid or myomorph sp.

Figure 7

SPECIMEN: CM 9951, left upper molar, probably M¹.

GEOLOGIC AGE AND LOCALITY: Duchesnean (Randlett member), late Eocene; two miles northeast of Randlett Point, Uintah Co., Utah.

DESCRIPTION: The four main cusps of this relatively low crowned, only slightly worn upper molar are well developed, and the tooth has a distinct anterior cingulum forming its anterior wall. Paracone and metacone are rounded buccally, tapered lingually. Protocone and hypocone are separated from one another by a distinct groove. A ridge extends obliquely forward from the protocone to contact the anterior

cingulum near its buccal end. An expansion on this ridge lingual to the paracone may represent a protoconule. A second ridge, approximately paralleling the first, runs obliquely forward from the hypocone; at about the center of the transverse valley of the molar this ridge divides, sending forward a short process to the base of the paracone and buccad a mesoloph almost to the buccal side. A small but distinct mesostyle occurs in the buccal exit of the transverse valley, anterior to and not in contact with the mesoloph. A posterior cingulum extends from the hypocone to the buccal side, forming the posterior wall of the tooth and separated from the metacone by a deep valley except at the posteroexternal edge of the tooth.

COMPARISONS AND RELATIONSHIPS: This single tooth is more tantalizing than edifying, but illustrates well not only the frustrations inherent in studies of isolated teeth but also the potential of late Eocene rodents. Some of its characteristics are reminiscent of the Sciuravidae, relatively primitive Eocene sciuromorph rodents, and others are found in *Simimys vetus*, *S. simplex*, and ?*S. murinus*, late Eocene rodents, of uncertain familial reference (to Zapodidae by Stehlin and Schaub, 1951, and Wood, 1955; tentatively to Cricetidae by Wilson, 1949b: 123-124), that are probably early myomorphs. Resemblance of CM 9951 to upper molars of *Sciuravus* is seen in the quadrate shape with four well developed cusps, cresting of protocone and hypocone, and a shelf-like anterior cingulum. However, in no species of *Sciuravus* are the anteroexternally directed crests from protocone and hypocone so obliquely oriented as in CM 9951, not even in *S. powayensis*, a late Eocene species having some tendency in this direction (Wilson, 1940: 87-91). Further differences from *Sciuravus* are the presence in CM 9951 of a more elongated crest from the protocone that contacts the anterior cingulum anterobuccally, and a better developed mesoloph. *Simimys* resembles both *Sciuravus* and CM 9951 in having quadrate upper molars, but is more similar to the latter in having obliquely oriented crests. Molars of *Simimys* and ?*S. murinus* are smaller and tend to be relatively more elongated anteroposteriorly than in CM 9951. *Simimys vetus* and ?*S. murinus* resemble CM 9951 in having the crest from the protocone extend to contact the cingulum anterobuccally, whereas in *S. simplex* the crest extends to the anterior side of the paracone. A striking difference from CM 9951 is presence in *Simimys vetus* and *S. simplex* of a strong, posteroexternally directed crest from the protocone, the "mure" of Wilson (1949a: 20-21), which contacts the crest from the hypocone in the transverse valley. Crests and cusps of these species thus produce a W-shaped lingual

pattern. ?*Simimys murinus* and CM 9951 are more similar lingually, the former having only rudimentary development of the "mure." *Simimys simplex* and CM 9951 have in common a longer mesoloph than in *S. vetus* and ?*S. murinus*. Thus, CM 9951 combines a basically similar pattern with details found variously in *S. vetus*, *S. simplex*, and ?*S. murinus*.

Evidence for taxonomic assignment of *Simimys* and ?*S. murinus* is based not only on tooth morphology but also on dental formula and skull structure, especially as shown by ?*S. murinus*. The careful analysis by Wilson (1949a: 18-24) of all evidence available for the species involved led to the interpretation of these rodents as primitive myomorphs that were perhaps not yet differentiated into the muroid and dipodoid levels, were not directly ancestral to later myomorphs, and, further, were derived from sciuravids. For CM 9951 evidence on relationships comes from tooth morphology only, and this is not adequate to indicate the evolutionary level attained by the rodent represented. Dental similarities to sciuravids and to *Simimys* of CM 9951 suggest that this is a late Eocene rodent somewhere in the sciuravid-myomorph menage. Whether sciuravid or primitive myomorph only more adequate specimens will determine.

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